Renewing Pelee Island’s Pumped Drainage Schemes – A Case Study

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Pelee Island – A Unique Township

- Located in Western Basin of Lake Erie
- Southernmost municipality in Canada
Some Relevant History

- Originally 3 or 4 smaller islands surrounded by Lake Erie and wetlands
- Drained in late 1800’s for agricultural purposes
- Dykes constructed along exterior barrier beaches
- Elaborate canal system constructed with pumped outlets
PLAN OF PELEE ISLAND
IN LAKE ERIE
SURVEYED BY A. WILKINSON P.L.S.
1ST NOV 1866.
- 3 pumped drainage schemes created in late 1800’s

- Big Marsh (2 pump stations)
  - 2470 hectare (6100 acre) tributary area
  - 2100 hectares prone to lake flooding

- Curry Marsh
  - 587 hectare (1450 acre) tributary area
  - 300 hectares prone to lake flooding

- Round Marsh
  - 195 hectare (480 acre) tributary area
  - 170 hectares prone to lake flooding
From the Archives

Big Marsh

West Pump

East Pump
Pump Stations in 2008

- Big Marsh North Pump
- Big Marsh West Pump
- Curry Marsh Pump
- Round Marsh (East) Pump
Big Marsh North Pump

- Structural and foundation deficiencies
- Building encroaching on roadway
Big Marsh West Pump

- Structural and foundation deficiencies
- Lake water piping back to canal around discharge culvert
Curry Marsh (South) Pump

- Structural and foundation deficiencies
- Lake water piping back to canal around discharge culvert
Curry Marsh (South) Pump

- Structural and foundation deficiencies
- Poor location of outlet on populated beach
Canal Systems

- drainage schemes incorporate systems of large drainage canals

- The canal banks have not been brushed in many years and are now regarded as important habitat for endangered and threatened species (Provincial) and for species at risk (Federal)
Natural Heritage of Pelee Island

- Pelee Island is a key component of Ontario’s biodiversity
- Savannas, forests and regenerating fields make up almost 25 percent of the Island’s total area

Photo By Ethan Meleg
Municipal Infrastructure Investment Initiative (MIII)

- January 2008 – Council resolved to replace the pump station and sought funding
- $1.8 Million funding received for $2.0 Million project
- Landmark Engineers Inc. retained to manage project
Scope of Engineering Services

- Develop scope of repairs, prepare tender and contract documents, and administer construction of pump station replacements

- Prepare Engineer’s Report pursuant to provisions of *Drainage Act* in order to incorporate the renewed pump stations into the respective drainage schemes
Initial Conclusions

- Desire of residents and Council to eliminate Round Marsh (East) Pump and redirect flows to Big Marsh
- Decision to pursue this based on economic and environmental considerations
Reconstruction of Big Marsh North Pump

- Reconditioned existing pumps and diesel engines
- New building enclosure on existing (modified) foundation
- Utilization of existing wet wells
- Installation of new electric pump
Reconstruction of Big Marsh North Pump
(other features)

- New reinforced concrete overlay on floor (with new steel gratings)
- New control room with PLC
- Pump station equipped with gas detectors (e.g., CO detector)
- Station equipped with bubbler system to mitigate freezing
Reconstruction of Big Marsh West Pump

- New building enclosure on new steel frame foundation
- Replacement of single axial flow pump with two new pumps and diesel engines
- Construction of new steel sheet pile wet well and utilization of existing wet well as discharge chamber for new pumps
- Installation of new electric pump
Reconstruction of Big Marsh West Pump (other features)

- Twinning of pump station resulted in 33% increase in pump capacity for Big Marsh
- New box culvert discharge piping to accommodate increased capacity
- Snake hibernacula incorporated as part of discharge chamber construction
- Station equipped with bubbler system to mitigate freezing
Reconstruction of Big Marsh West Pump (other features)
Reconstruction of Curry Marsh (South) Pump

- New building enclosure on new steel frame foundation
- Reconditioning of one existing axial flow pump and one diesel engine. Replacement of one pump and engine.
- Construction of new steel sheet pile wet well and new precast discharge chamber and discharge pipe
- Installation of new electric pump
Reconstruction of Curry Marsh (South) Pump (other features)
Reconstruction of Curry Marsh (South) Pump (other features)
Works yet to be completed

- Diversion of Round Marsh to Big Marsh
- Further refinements to Pump Stations
Notables of Engineers Report

- assessment plans and schedules updated to reflect current ownership and land usage

- Project Costs assessed to ratepayers
  - Preparation of Engineers Report
  - Works needed to divert Round Marsh to Big Marsh
  - Cost overrun from original MIII works
Interesting Aspects of Schedules of Assessment

- Costs of Implementing Round Marsh Diversion assessed to all drainage schemes
- Benefit vs. Outlet (impact of order of assessment)
- Special Benefit assessed to property owners along beach near Round Marsh Outlet
Special Acknowledgement

Mr. Jim Monteith, P.Eng.
Questions?